The Huygens Atmospheric Structure Instrument (HASI) results at Titan

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The Huygens Atmospheric Structure Instrument (HASI) is a multi sensor package which measured the main physical characteristics of the Titan atmosphere in all the phases of the Huygens probe mission at Titan: entry, descent and impact.
The HASI instrument package had a total mass of 5.7 kg. The accelerometers package (ACC) was mounted at the center of mass of the Probe and the temperature sensors (TEM) and the pressure probe inlet were mounted on a stem outside of the Probe. Two deployable booms carrying Permittivity ad Wave electrodes stowed under the thermal shield of Huygens, has been deployed at the beginning of the descent into Titan's atmosphere.
HASI's suite of sensors measured the physical and electrical properties of Titan's atmosphere. Profiles of temperature, pressure, density, atmospheric conductivity have been determined along the Huygens descent trajectory.. HASI investigated the electric properties and the nature of the surface at the Huygens landing site . The accelerometers (ACC sensors) provided data from the very beginning of the entry phase (1500 km altitude) allowing us to obtain the density profile from which we derived pressure and temperature profiles under the assumption of hydrostatic equilibrium.
Temperature and pressure profile were obtained by direct measurements of T (TEM sensors) and P (PPI package) during descent (from 162 km down to the surface) and for half an hour at the surface, providing us with hints on the vertical structure of Titan’s lower atmosphere and local meteorology.
The Permittivity and Wave Analyzer sensors measured the electron and ion conductivities as well as the complex permittivity of the atmosphere at 45 Hz and searched for electric wave activity including lightning. Acoustic signals collected by the HASI microphone were processed by the on board FFT and their amplitude and main frequency, averaged over two minutes, were transmitted to the ground. The radar altimeter return signal recorded in the range of altitude 0-30 km have been processed by the HASI data processing unit in order to perform spectral analysis (FFT), providing us with information both on the elevation of the Probe in the last part of the descent and on some physical properties of Titan’s surface.
Furthermore the ACC recorded the signature of the impact of the Probe at the surface of Titan.
In addition to its own scientific data, HASI provided unique data for the reconstruction of attitude and trajectory of the Huygens probe and calibration information of use by other instruments on Huygens and by remote sensing observations from the Cassini orbiter.